into independent Claims 1, 2 and 9 by replacing "tertiary amino group, a quaternary ammonium group, or a nitrogen atom-containing heterocyclic group" with "1-imidazolyl." Support for this amendment can be found at least in originally presented Claims 1, 2, 9 and 12 as filed.

Entry of the amendments will place the application in immediate condition for allowance for the reasons that follow. In addition, the features added into the independent claims have been previously considered in Claim 12. Accordingly, entry of the amendments is proper.

Turning to the Official Action, Claim 12 was rejected under §103(a) as being obvious over *Schwarz, Jr.* (U.S. Patent No. 5,990,198) or *Gundlach et al.* (U.S. Patent No. 6,054,505). Respectfully, this rejection has been obviated by the above amendment, canceling Claim 12.

Turning now to the remaining rejections, Claims 1, 2, 5 and 8-12 were rejected under §102(e) over *Nigam et al* (U.S. Patent No. 5,973,025); Claims 1, 2, 5 and 8-11 stand rejected under §102(e) over *Shimomura et al* (U.S. Patent No. 5,886,638); Claims 1, 2, 5 and 8-11 stand rejected under §102(e) over *Schwarz, Jr.*; and Claims 1, 2, 5 and 8-11 stand rejected under §102(e) over *Gundlach et al.* The reasons for these rejections are set forth in sections 3-6, respectively, of the Official Action. For at least the following reasons, withdrawal of these rejections is respectfully requested.

The present invention relates to a jet printing ink and an ink-image forming method using an ink jet printer. Claim 1 as amended above sets forth a jet printing ink comprising a dye and an aqueous medium, which further comprises glycerol and a basic polymer

having a side-chain containing 1-imidazolyl. The basic polymer is contained in an amount of 0.1 to 50 weight % and the ink has a viscosity of 50 cp or lower at 25°C. Independent Claim 9 is directed to a method of forming an ink image on a receiving sheet using an ink jet printer. The method of Claim 9 comprises jetting drops of an ink as described above with respect to Claim 1.

Respectfully, "anticipation requires the presence in a single prior art disclosure of all elements of a claimed invention as arranged in the claims." Jamesbury Corp. v. Litton Industrial Products, Inc. 225 U.S.P.Q. 253, 256 (Fed. Cir. 1985). That is not the case here.

Nigam et al. describes aqueous ink compositions containing an aqueous liquid vehicle, an effective amount of a colorant, and a binder material adapted to ionically or physically entrap the colorant. (*See* column 8, lines 52-55.) The binder material may be a single polymer, a mixture of two or more polymers, a mixture of a monomer and a polymer, or a mixture of two or more monomers. (*See* column 8, lines 55-58.) The binder resins may be Group A, B, C or D resin. (*See* column 10, lines 47-51.) Examples of Group A resins are shown, for example, at column 12, line 11 to column 14, line 53. The ink compositions may further comprise other components such as urea or an alkyl-substituted urea, a humectant, *e.g.*, triacetin, N-methyl-2-pyrrolidone, and glycerol, anti-foaming agents, viscosity modifiers, surface tension control agents, preservatives, biocides, cross-linking agents and polyethylene glycol. (*See* column 11, lines 27-34.) The preferred viscosity of a jet printing ink is in the range of approximately 1.5 to 15 cP. (*See*, *e.g.*, column 18, lines 40-45.)

Nigam et al. does not disclose each and every feature of the invention. In contrast to the claimed invention, *Nigam et al.* does not specifically disclose the combination of glycerol and a basic polymer having a side-chain containing 1-imidazolyl. For example, *Nigam et al.* discloses 35 examples of ink jet compositions, (*i.e.* examples 14-48). Only 6 examples (*i.e.*, examples 29-32, 35 and 37) use a basic polymer having a side-chain containing 1-imidazolyl, none of which employ glycerol. Only one example (*i.e.*, example 44) uses glycerol. That example, however, does not employ 1-imidazolyl. Thus, *Nigam et al.* does not disclose any example using a glycerol and a basic polymer having a side-chain containing 1-imidazolyl.

Applicants respectfully submit that withdrawal of this anticipation rejection is in order.

Shimomura et al. relates to a recording ink, which is used together with a liquid composition comprising a cationic substance. (*See, e.g.*, column 9, lines 18-22.) The recording ink includes a water-soluble polymeric compound having an alicyclic, nitrogen-containing heterocycle and a coloring material. (*See* column 10, lines 61-64 and column 11, lines 32-54.) The aqueous media used in the recording ink may be water, mixed solvents of water and a water-soluble organic solvent, and the like. (*See* column 13, lines 37-41.) Glycerol is listed among an extensive list of water-soluble organic solvents. (*See* column 13, lines 42-58.)

Shimomura et al. does not disclose each and every feature of the invention. In contrast to the claimed invention, *Shimomura et al.* does not specifically disclose the combination of glycerol and a basic polymer having a side-chain containing 1-imidazolyl.

In fact, *Shimomura et al.* does not even disclose that the ink contains a basic polymer having a side-chain containing 1-imidazolyl. To the contrary, *Shimomura et al.* uses a "water-soluble polymeric compound having an ***alicyclic***, nitrogen-containing heterocycle" at column column 10, lines 61-64 (emphasis added).

Further, *Shimomura et al.* is noticeably silent with respect to the viscosity of the ink, and does not disclose that the ink has a viscosity of 50 cp or lower at 25°C. The Official Action alleges that *Shimomura et al.* also inherently possesses viscosity as presently claimed. However, it is well established that in order for prior art to anticipate a claimed invention the inherency must be certain. Ex parte Cyba, 155 USPQ 756 (POBA 1966). The fact that a prior art article "may" inherently have the characteristics of the claimed product is not sufficient. Ex parte Skinner, 2 USPQ2d 1788 (BPAI 1986). Inherency must be a necessary result and not merely a possible result. In re Oelrich, 212 USPQ 323 (CCPA 1981). Moreover, the Patent Office must provide some evidence or scientific reasoning to establish the reasonableness of such belief before Applicants can be required to demonstrate the subject matter shown to be in the prior art does not possess the characteristics relied upon. Ex parte Skinner, 2 USPQ2d 1788, 1789 (BOPA 1986).

This is not the case here. The Examiner bases the inherency contention regarding viscosity on an alleged identity of types and amounts of ingredients as presently claimed. (*See* Official Action at page 4.) Quite clearly, there is no identity of ingredients as discussed above. Accordingly, the disclosure of the presently claimed viscosity by *Shimomura et al.* has not been established with the requisite certainty.

Since *Shimomura et al.* does not disclose or fairly suggest the claimed invention, Applicants respectfully submit that withdrawal of this anticipation rejection is in order.

Schwarz, Jr. relates to compositions suitable for use in ink jet printing processes, which may comprise water, a dye and a copolymer of vinyl pyrrolidinone and a vinyl imidazolium salt. (*See, e.g.*, column 1, lines 6-13.) The copolymer is described at column 7, line 5 to column 8, line 25. The copolymer may be present in an amount typically from about 0.1 to about 30 weight percent by weight of the ink. (*See* column 8, lines 17-25.) *Schwarz, Jr.* discloses that the inks contain an aqueous liquid vehicle, which consists solely of water, or can comprise a mixture of water and a water soluble or water miscible organic component. Glycerine is listed as one of many possible water soluble or water miscible organic components. (*See* column 6, lines 42-60.) The ink compositions typically have a viscosity of no more than about 10 centipoise. (*See* column 10, lines 24-30.)

Schwarz, Jr. does not disclose each and every feature of the invention. In contrast to the claimed invention, *Schwarz, Jr.* does not specifically disclose the combination of glycerol and a basic polymer having a side-chain containing 1-imidazolyl, as set forth, for example, in independent Claims 1 and 9. In fact, *Schwarz, Jr.* does not specifically disclose a basic polymer having a side-chain containing 1-imidazolyl.

Since *Schwarz, Jr.* does not disclose or fairly suggest the claimed invention, Applicants respectfully submit that withdrawal of this anticipation rejection is in order.

Gundlach et al. relates to compositions suitable for use in ink jet printing processes, which comprise (1) water; (2) a nonpolymeric salt comprising at least one cation and at least one anion; (3) an anionic dye; and (4) a polyquaternary amine compound. (*See, e.g.*,

column 1, lines 5-17.) The polyquaternary amine compound is a polymer containing quaternary groups in the repeat units thereof. (*See* column 7, lines 25-27.) Copolymers of of vinyl pyrrolidinone and a vinyl imidazolium salt are described at column 11, line 65 to column 13, line 12. The liquid vehicle can consist solely of water, or it can comprise a mixture of water and a water soluble or water miscible organic component. (*See* column 6, lines 65-67.) Glycerine is listed among an extensive list of possible water soluble or water miscible organic components. (*See* column 6, line 67 to column 7, line 13.) Typically, the viscosity of the ink is no more than 10 centipoise. (*See* column 23, lines 18-24.)

Gundlach et al. does not disclose each and every feature of the invention. In contrast to the claimed invention, *Gundlach et al.* does not specifically disclose the combination of glycerol and a basic polymer having a side-chain containing 1-imidazolyl, as set forth, for example, in independent Claims 1 and 9. In fact, *Gundlach et al.* does not specifically disclose a basic polymer having a side-chain containing 1-imidazolyl at all.

Since *Gundlach et al.* does not disclose or fairly suggest the claimed invention, Applicants respectfully submit that withdrawal of this anticipation rejection is in order.

Claims 1-2, 5, 8-9 and 11-12 stand rejected under §103(a) as being obvious over *Bates et al.* (U.S. Patent No. 5,958,999), taken in view of *Breton et al.* (U.S. Patent No. 5,938,827) and *Nigam et al.* The reasons for this rejection are set forth in section 9 of the Official Action. Respectfully, Applicants traverse this rejection for at least the following reasons.

Based on a complete understanding of the present invention as now claimed, it is respectfully submitted that the claims cannot properly be rejected based on the documents as applied in the Official Action.

Bates et al. describes ink compositions comprising a colorant and at least one polymer selected from polyvinylimidazole, derivatives of polyvinylimidazole, copolymers of vinylimidazole and copolymers of vinylimidazole derivatives. (*See, e.g.*, column 2, lines 47-51.) The polymer is typically present in an amount between about 0.1% and 10%. (*See, e.g.*, column 3, lines 28-33.) *Bates et al.* states that suitable additives may be incorporated into the ink compositions to impart a number of desired properties while maintaining the stability of the compositions, and that such additives may include, for example, humectants, biocides, binders, dryng accelerators, penetrants, surfactants, and the like. (*See* column 7, lines 23-26.) Glycerine is listed among a long list of possible humectants at column 7, lines 34-42.

Bates et al. does not disclose each and every feature of the claimed invention. For example, *Bates et al.* does not specifically disclose the combination of glycerol and a basic polymer having a side-chain containing 1-imidazolyl, as set forth, for example, in independent Claims 1 and 9. However, *Bates et al.* fails to specifically disclose or fairly suggest the combination of glycerol and a basic polymer having a side-chain containing 1-imidazolyl.

Further, although there is a general description that at least one polymer is selected from polyvinylimidazole, derivatives of polyvinylimidazole, copolymers of vinylimidazole

and copolymers of vinylimidazole derivatives, *Bates et al.* does not specifically disclose a basic polymer having a side-chain containing 1-imidazolyl at all.

As for the secondary documents, neither *Breton et al.* nor *Nigam et al.* remedy the shortcomings of the primary documents.

Breton et al. relates to ink compositions comprising a mixture of colorants, and an ink vehicle, and optional known ink additives, which preferably have a viscosity from about 1 centipoise to about 10 centipoise at a temperature of from about 25°C to about 50°C. (*See*, column 3, lines 36-42.)

Breton et al. fails to remedy the shortcomings of *Bates et al.* Like *Bates et al.*, *Breton et al.* fails to specifically disclose the combination of glycerol and a basic polymer having a side-chain containing 1-imidazolyl, as set forth, for example, in independent Claims 1 and 9. In fact, *Breton et al.* fails to disclose or fairly suggest an ink composition comprising a polymer at all, much less that it should be a basic polymer having a side-chain containing 1-imidazolyl, or that the basic polymer is contained in an amount of 0.1 to 50 weight %.

Nigam et al. has been described above. *Nigam et al.* fails to remedy the shortcomings of *Bates et al.* and *Breton et al.* The Examiner relies on *Nigam et al.* for that document's alleged disclosure of adjustment of viscosity of an ink depending on its desired utility. However, even if one would have combined *Nigam et al.* with *Bates et al.* and *Breton et al.* in the manner suggested in the Official Action, the present invention would not have resulted. For example, the resulting jet printing ink would not include the specifically claimed combination of glycerol and a basic polymer having a side-chain

containing 1-imidazolyl. Accordingly, the rejection should be withdrawn at least on this basis.

Moreover, the applied documents would not lead one of ordinary skill in the art to use the combination of glycerol and a basic polymer having a side-chain containing 1-imidazolyl. In fact, quite to the contrary, one skilled in the art would not be motivated to use a viscous polymer (such as the basic polymer having a side-chain containing 1-imidazolyl) in combination with a viscous compound (such as glycerol) in an jet printing ink. As described in the specification on page 3, lines 20-28, the basic polymer having a side chain containing 1-imidazolyl increases the viscosity of the ink jet ink. The ink, however, preferably has a low viscosity because the ink should be ejected through a nozzle. Glycerol is a well-known viscous compound, which increases the viscosity of the ink jet ink. Therefore, one skilled in the art would not be motivated to use glycerol and a basic polymer having a side-chain containing the 1-imidazolyl polymer in combination with glycerol in an ink jet ink.

Each of the applied documents teaches an extensive number of additional components that may be added to ink jet compositions. (*See*, e.g., *Bates et al.* at column 7, lines 23-47, *Breton et al.* at column 4, lines 23-34, or *Nigam et al.* at column 11, lines 27-56.) Thus, to arrive at Applicants' claimed invention, one of ordinary skill in the art would have to pick and choose from among the universe of additional components for ink jet compositions that are broadly disclosed by the applied documents. Respectfully, the applied documents provide no guidance or motivation to pick and choose from among the universe of possible additional components that may be added to ink jet compositions to

arrive at a jet printing ink comprising the combination of glycerol and a basic polymer having a side-chain containing 1-imidazolyl.

Respectfully, to establish a *prima facie* case of obviousness under 35 U.S.C. §103, three basic criteria must be met: (1) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to modify the reference or combine reference teachings, (2) there must a reasonable expectation of success, and (3) the prior art reference or references when combined must teach or suggest all the claim limitations. (*See* MPEP §2142 *et seq.*). Applicants respectfully submit that in this instance, these criteria have not been met. Accordingly, no *prima facie* case of obviousness is present.

Moreover, even assuming (incorrectly) that a *prima facie* case is present, the surprising and unexpected results that can be achieved through the invention are not suggested by the applied documents. In this regard, the advantages of the present invention over the prior art are demonstrated in the attached unexecuted Declaration under 37 C.F.R. §1.132. The executed Declaration will be forwarded in due course. As described in the attached Declaration, a series of experiments were carried out, which demonstrate the importance of using a combination of glycerol and a basic polymer having a side-chain containing 1-imidazolyl.

In Comparison Example 21, a jet-printing aqueous ink was prepared using poly(vinylpyridine) and glycerol in the same manner as in Example 44 of *Nigam et al.*

In Examples 21-24 in accordance with the invention, and Comparative Example 22, jet-printing aqueous inks were prepared in the same manner as in Comparison Example 21,

except that 1-imidazolyl polymer (in Examples 21-24) or 2-imidazolyl polymer (in Comparison Example 22) were used in place of poly(vinylpyridine).

In Comparison Examples 23-28, jet-printing aqueous inks were prepared in the same manner as in Comparison Example 21, Examples 21-24 and Comparison Example 22 respectively, except that the glycerol was not used.

The prepared aqueous inks were evaluated in the same manner as in Examples 1-12, in accordance with the invention, as set forth in the specification on pages 35-39. The results are summarized in Table 3 on page 5 of the Declaration.

As demonstrated by the data in Table 3, the jet-printing ink of Examples 21-24 according to the present invention (using the combination of glycerol and a basic polymer having a side-chain containing 1-imidazolyl) form images of good hue and high resistance to light in various receiving sheets. Further, no adverse effect on the ejection of the inks of Examples 21-24 from the nozzle was observed. In contrast, the ink jet inks of Comparison Example 21 and Comparison Example 22 using other basic polymers form images with less resistance to light. Further, the ink jet inks of Comparison Example 23 and Comparison Example 28 containing no glycerol form images which had inferior hue.

As demonstrated by the data in Table 3, the effect of the present invention is obtained by using the combination of glycerol and a basic polymer having a side-chain containing 1-imidazolyl. The effect of the invention cannot be expected from the combination of the applied documents. In this regard, none of *Bates et al.*, *Breton et al.* or *Nigam et al.* recognize the surprising and unexpected results that can be achieved in

accordance with the present invention, which use the combination of glycerol and a basic polymer having a side-chain containing 1-imidazolyl.

From the foregoing, further and favorable action in the form of a Notice of Allowance is believed to be next in order, and such action is earnestly solicited.

If there are any questions concerning this paper or the application in general, the Examiner is invited to telephone the undersigned.

Respectfully submitted,

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Date: January 28, 2002

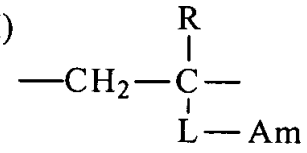
Attachment to Amendment dated January 28, 2002

Marked-up Copy

1. (Four Times Amended) A jet printing ink comprising a dye and an aqueous medium, which further comprises glycerol and a basic polymer having a side-chain containing [a tertiary amino group, a quaternary ammonium group, or a nitrogen atom-containing heterocyclic group] 1-imidazolyl, wherein the basic polymer is contained in an amount of 0.1 to 50 weight % and the ink has a viscosity of 50 cp or lower at 25°C.

2. (Three Times Amended) The jet printing ink of claim 1, wherein the basic polymer contains a repeating unit of the following formula (I):

(I)



in which R is a hydrogen atom or methyl; L is a single bond, -CO-, -O-, an alkylene group, an arylene group, or a combination thereof; and Am is a [tertiary amino group, a quaternary ammonium group, or a nitrogen atom-containing heterocyclic group] 1-imidazolyl.

Attachment to Amendment dated January 28, 2002

Marked-up Copy

9. (Three Times Amended) A method of forming an ink image on a receiving sheet using an ink jet printer, which comprises jetting drops of an ink comprising a dye and an aqueous medium which further comprises glycerol and a basic polymer having a side-chain containing a [tertiary amino group, a quaternary ammonium group, or a nitrogen atom-containing heterocyclic group.] 1-imidazolyl, wherein the basic polymer is contained in an amount of 0.1 to 50 weight %, and the ink has a viscosity of 50 cp or lower at 25°C.